Fig. 1. Mathematical Model of Target World and Sensor Manager
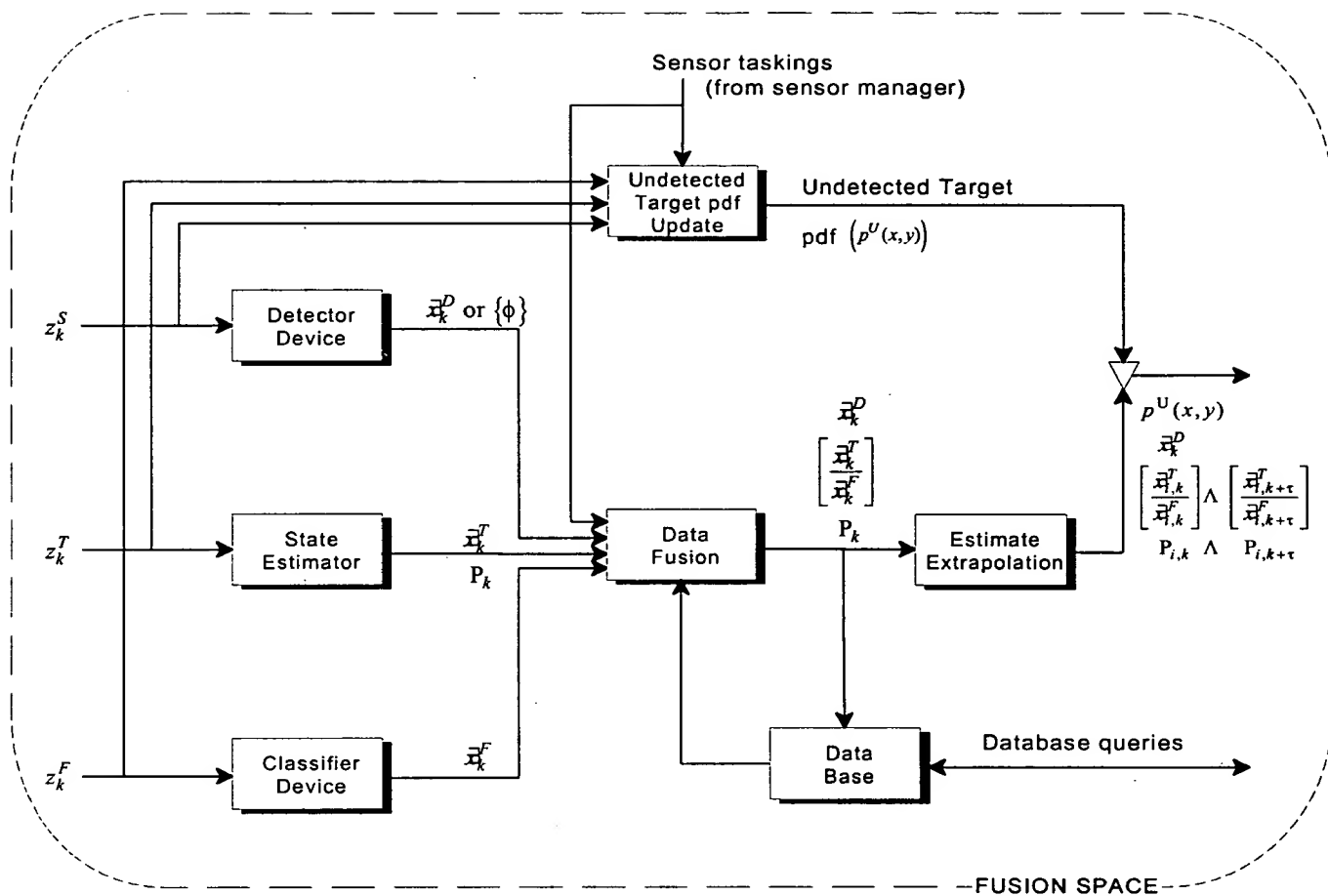
Sensor taskings
(from sensor manager)

Undetected
Target pdf
Update

Undetected Target
pdf $\left(p^U(x,y)\right)$

z_k^S

Detector
Device

$\vec{x}_k^D$ or $\{\phi\}$

z_k^T

State
Estimator

$\vec{x}_k^T$

P_k

$\vec{x}_k^D$

$\left[\dfrac{\vec{x}_k^T}{\vec{x}_k^F}\right]$

Data
Fusion

P_k

Estimate
Extrapolation

$p^U(x,y)$

$\vec{x}_k^D$

$\left[\dfrac{\vec{x}_{i,k}^T}{\vec{x}_{i,k}^F}\right] \Lambda \left[\dfrac{\vec{x}_{i,k+\tau}^T}{\vec{x}_{i,k+\tau}^F}\right]$

$P_{i,k}$ Λ $P_{i,k+\tau}$

z_k^F

Classifier
Device

$\vec{x}_k^F$

Data
Base

Database queries

FUSION SPACE

Fig. 2. Fusion Space Block Diagram

FUSION SPACE

Measurement to Observation

Observation to Information

Measure-ment

$$p^{U}(x,y)$$

$$\begin{bmatrix} \hat{x}_{i,k}^{T} \\ \hat{x}_{i,k}^{F} \end{bmatrix} \Lambda \begin{bmatrix} \hat{x}_{i,k+\tau}^{T} \\ \hat{x}_{i,k+\tau}^{F} \end{bmatrix}$$

$$\mathbf{P}_{i,k} \Lambda \, \mathbf{P}_{i,k+\tau}$$

Order of Battle
Intel Estimates
Enemy Doctrine
Wpn Characteristics

Data Base

Human Operator

Sensors

Mission Goals/
Objectives (offline)

Real-time
requests

INFORMATION SPACE

$$\begin{bmatrix} \mathbf{H}_{k}^{S} \\ \mathbf{H}_{k}^{T} \\ \mathbf{H}_{k}^{F} \end{bmatrix}$$

Sensor Status

Measurement Request

Mission Manager

Information Request Status

Information Request

Weights/ Priority

SENSOR MANAGER

Sensor Scheduler (OGUPSA)

Request Rejection

Observation Request
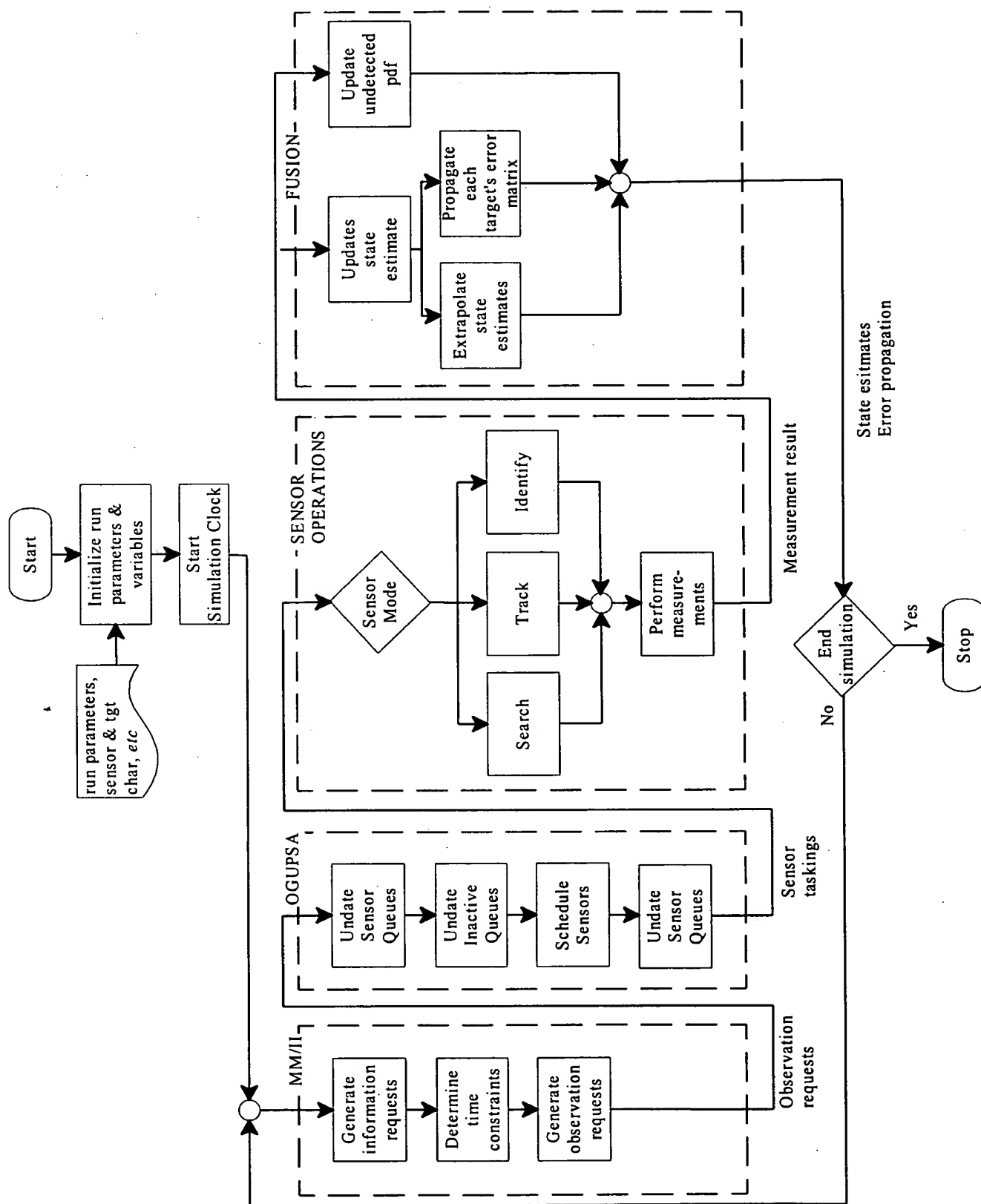
Information Instantiator

Fig. 3. Information Based Hierarchical Sensor Management Model

Fig. 4. Simulation Model Architecture